MISCELLANEOUS PHENOMENA.

HALOS.

Solar and lunar halos were reported in New England and the middle Atlantic states on twenty-seven dates; 93 per cent. of the halos were attended on the first day, 89 per cent. were followed on the second day, and 85 per cent. were followed on the third day by rain or snow. In the south Atlantic states halos were reported on fifteen dates; 87 per cent. of the halos were attended on the first day, 80 per cent. were followed on the second day, and 73 per cent. were followed on the third day by rain. In the Gulf States halos were reported on thirteen dates; 62 per cent. of the halos were attended on the first day, 77 per cent. were followed on the second day, and 62 per cent. were followed on the third day by rain. In the Mississippi and Ohio valleys halos were reported on twenty-five dates; 100 per cent. of the halos were attended on the first day, 92 per cent. were followed on the second day, and 84 per cent. were followed on the third day by rain. In the Lake region halos were reported on twenty-two dates; 95 per cent. of the halos were attended on the first day, 100 per cent. were followed on the second day, and 95 per cent. were followed on the third day by rain. In the Missouri Valley halos were reported on fifteen dates; 60 per cent. of the halos were attended on the first day, 73 per cent. were followed on the second day, and 93 per cent. were followed on the third day by rain or snow. In the Rocky Mountain and plateau regions halos were reported on ten dates; 90 per cent. of the halos were attended on the first day, 70 per cent. were followed on the second day, and 40 per cent. were followed on the third day by rain or snow. On the Pacific coast halos were reported on fifteen dates; 32 per cent. of the halos were attended on the first day, 13 per cent. were followed on the second day, and 27 per cent. were followed on the third day by rain or snow. In New England and the middle Atlantic states 52 per cent. of the halos occurred in advance of, and 48 per cent. following, low pressure storms. In the south Atlantic states 53 per cent. of the halos occurred in advance of, and 47 per cent. following, low pressure storms. In the Gulf States 56 per cent. of the halos occurred in advance of, and 44 per cent. following, low pressure storms. In the Mississippi and Ohio valleys 72 per cent. of the halos occurred in advance of, and 28 per cent. following, low pressure storms. In the Lake region 73 per cent. of the halos occurred in advance of, and 27 per cent. following, low pressure storms. In the Missouri Valley 47 per cent. of the halos occurred in advance of, and 53 per cent. following, low pressure storms. In the Rocky Mountain and plateau regions 30 per cent. of the halos occurred in advance of, and 70 per cent. following, low pressure storms. On the Pacific coast 13 per cent. of the halos occurred in advance of, and 87 per cent. following, or without the influence of, low pressure storms.

DROUGHT.

A report from Gove City, Kans., stated that wheat and rye in that section were almost ruined by dry weather. Advices from Eola, Oregon, stated that crops in that region were suffering for want of rain. Press dispatches from western and northwestern Kansas stated that the drought in those regions was broken by heavy rain the night of the 29th.

METEORS.

Meteors were observed as follows: 1st, Carson, Iowa. 2d, Alta, Ames, Algona, Bancroft, Britt, Des Moines, Fayette, Grinnell, Humboldt, Logan, Sioux City, Storm Lake, West Bend, and Wesley, Iowa; Princeton, Mo.; and Madison, N. J. 6th, Oregon, Mo. 7th, Cockrell, Ill.; Manhattan, Kans. 8th, Kirk, Colo. 9th, Fort Custer, Mont. 11th, Austin, Nashville, and Nunnelly, Tenn. 15th, Lansing, Mich.; and Madison, Wis. 17th, Vevay, Ind.; Harrodsburgh, Ky.; Lansing, Mich.; and Rugby, Tenn. 18th, Blakeville, Iowa. 19th, Beverly, N. J. 21st, Rugby, Tenn. 22d, Egg Harbor City, N. J.; Portsmouth, Ohio; Webster and Wolsey, S. Dak. 23d, Rugby, Tenn. 24th, Marquette, Mich. 25th, Beaver, Utah. 26th, Wolsey, S. Dak. 27th, Vevay, Ind.; Westerville, Ohio. 28th, Englewood, Kans. 29th, Rugby, Tenn. 30th, Thon, Colo.; Mesquite, Tex. 31st, Heppner, Oregon.

The following is an extract from the report of the Iowa weather and crop service relative to an aerolite observed in that state on the 2d: "On the 2d, at about 5.15 p. m., a large meteor was observed passing in a northeasterly direction over Sioux, O'Brien, Clay, Palo Alto, Kossuth, and Winnebago counties. The atmosphere was nearly cloudless and the meteor was sufficiently large and brilliant to be distinctly visible to observers at Des Moines, Atlantic, and other places in the southern half of the state; also from points in South Dakota and Minnesota. Before the meteor reached the earth an explosion occurred, causing a heavy report, and fragments of the meteor were found scattered over several square miles in the southwestern part of Winnebago county. The largest portion discovered, weighing about seventy pounds, was found in the north half of section 3, township 98, range 25, about eleven miles northwest of Forest City. At Britt, Hancock Co., the meteor was first seen at a point about 40° west of north, moving about northeast. There were five or six explosions, and the meteor left a trail of smoke, in puffs, following the line of its descent. At Forest City the direction of the meteor was from southwest to northeast, and it descended at an angle of about 28°. Reports from many points in the counties named agree in the main as to the direction, elevation, and great strength of the report of the meteor."

MIRAGE.

A very fine mirage was observed at Saint Vincent, Minn., on the 29th, at 5.10 a. m. The country for about thirty miles south of that place was plainly brought into view. Ground which is hid by intervening high ground was plainly visible in an elevated condition, and at the horizon the intervening space between the ground level and the mirage had the appearance of a trestle work or line of railroad. Mirage were also reported at Harrisburg, Pa., on the 11th, and at Woonsocket, S. Dak., on the 1st 7th, and 23d.

SUN SPOTS.

Haverford College Observatory, Pa. (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculæ.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	
May, 1890.										
1, 12 m	0	0	0	0	0	0	1	2	2	Definition good.
2, 11 a. m...	0	0	0	0	0	0	0	0	0	Definition poor.
3, 10 a. m...	0	0	0	0	0	0	0	0	2	Definition fair.
5, 10 a. m...	0	0	0	0	0	0	0	0	1	Definition fair.
7, 12 m	1	3	0	0	0	0	1	3	1	Definition fair; spots small.
8, 2 p. m...	0	5	0	0	0	0	1	8	1	Definition good; spots small.
9, 10 a. m...	0	14	0	0	0	0	1	22	2	Definition fine; spots small.
12, 9 a. m...	1	1	0	0	0	0	2	11	1	Definition fair; spots small.
13, 12 m	0	0	1	1	0	0	1	10	1	Definition fair; spots small.
14, 9 a. m...	0	0	0	0	0	0	1	14	2	Definition good; spots small.
15, 4 p. m...	0	0	0	0	0	0	0	0	0	Definition fair; spots small.
17, 10 a. m...	3	9	0	0	0	0	3	9	3	Definition fair; spots large.
18, 10 a. m...	0	0	0	0	0	0	2	9	3	Definition poor.
19, 10 a. m...	0	0	0	0	0	0	3	6	2	Definition fair.
20, 4 p. m...	1	1	1	2	0	0	3	4	1	Definition fair.
21, 9 a. m...	0	0	0	0	0	0	2	3	1	Definition poor.
22, 3 p. m...	0	0	0	0	0	0	1	2	2	Definition poor; spots small.
23, 4 p. m...	0	0	0	0	0	0	1	3	1	Definition fair.
24, 4 p. m...	0	0	0	0	0	0	0	0	2	Definition fair.
27, 4 p. m...	1	3	0	0	0	0	1	3	3	Definition good; spots small.
28, 9 a. m...	0	0	0	0	0	0	0	0	1	Definition fair.
29, 10 a. m...	0	0	0	0	0	0	0	0	0	Definition fair.
31, 10 a. m...	0	0	0	0	0	0	0	0	1	Definition poor.

Mr. C. E. Buzzell, Leaf River, Ill.: solar observations were

made during the month as follows: 3d to 9th, cloudy. 10th, two small spots first observed two days in on east limb; this group was breaking up on the 11th. 12th and 13th, cloudy. 14th, clear disc. 18th, one spot in south latitude just past meridian; also one spot in north latitude one day in on east limb; both in view on the 20th. 21st to 24th, cloudy. 25th, clear disc. 26th, one small spot one day past meridian, which had disappeared on the 27th. 28th to 31st, clear disc.

Mr. M. A Veeder, Lyons, N. Y.: May 5th, faculæ, that appeared by rotation April 22d, was at the western limb. 7th, faculæ and small spots appeared by rotation; the spots underwent many changes and faded out during the transit; the faculæ in their location was seen at the western limb on the 21st. 11th, small spots, not previously seen, were near the western limb. 16th, two spots appeared by rotation but had faded out on 21st and were not seen again. 18th, small spots and some faculæ were at the eastern limb. 26th, a spot, probably in the location of this disturbance, was seen, and on the 31st the faculæ in its vicinity was at the western limb. On the 18th a group of faculæ not previously seen was at the western limb. During the month solar disturbances were quite numerous but very evanescent.

Mr. John W. James, Riley, Ill.: observations were taken on the 1st, 2d, 6th, 7th, 8th, 10th, 11th, 14th, 16th, 17th, 18th, 20th, 21st, 23d, 25th to 31st, inclusive, but the only spots seen were one group, two days from eastern edge of disc, on the 10th, which was gone on the 14th, and a spot two days from western edge, 18th, which had disappeared, 21st.

Mr. H. D. Gowey, North Lewisburgh, Ohio: sun spots were observed on the 8th, 10th, 11th, and 12th.

PRAIRIE AND FOREST FIRES.

Prairie fires were reported near Fort Buford, N. Dak., on the 1st, 2d, 3d, 7th, and 8th, and a large field fire was reported near Los Angeles, Cal., on the 19th.

Forest fires were reported on the 5th at New Richmond, Wis., and near Stillwater and Red Lake Falls, Minn.

VERIFICATIONS.

FORECASTS FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for May, 1890, were made by 2d Lieutenant W. A. Glassford, Signal Corps, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, May, 1890.

States.		States.	
Maine	71.2	Kentucky	79.8
New Hampshire	77.2	Ohio	85.7
Vermont	76.5	West Virginia	81.9
Massachusetts	81.9	Indiana	87.0
Rhode Island	78.1	Illinois	86.9
Connecticut	77.7	Lower Michigan	77.7
Eastern New York	74.5	Upper Michigan	75.9
Western New York	88.2	Wisconsin	75.7
Eastern Pennsylvania	77.5	Minnesota	71.0
Western Pennsylvania	86.7	Iowa	81.4
New Jersey	77.2	Kansas	79.4
Delaware	83.5	Nebraska	81.2
Maryland	83.0	Missouri	86.3
District of Columbia	85.2	Colorado	76.3
Virginia	84.5	North Dakota	68.8
North Carolina	82.0	South Dakota	78.6
South Carolina	83.9	Southern California*	85.3
Georgia	84.0	Northern California*	78.9
Eastern Florida	87.9	Oregon*	82.6
Western Florida	85.7	Washington*	80.9
Alabama	80.2	*By elements:* Weather	82.6
Mississippi	78.3	Temperature†	77.7
Louisiana	80.3	Monthly percentage of weather and temperature combined‡	80.6
Texas	86.1		
Arkansas	78.8		
Tennessee	82.8		

*In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. †The forecasts of temperature in districts east of the Rocky Mountains for May, 1890, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. ‡The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

FORECASTS FOR 48 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for forty-eight and seventy-two hours, covering the second and third days in advance. Such forecasts are optional with the predicting officer, and are only made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 125; temperature, 51. Percentages of verifications: weather, 77.8; temperature, 70.2. Weather and temperature combined, 75.9.

No forecasts for seventy-two hours were made during the month.

CAUTIONARY SIGNALS FOR MAY, 1890.

Statement showing percentages of justifications of wind signals for the month of May, 1890:

Wind signals.—(Ordered by Lieutenant W. A. Glassford.) Total number of signals ordered, one hundred and fifty-four; justified as to velocity, wholly, eighty, partly, thirteen; justified as to direction, one hundred and twenty-nine. Of the signals ordered, one hundred and twenty-six were cautionary signals, of which sixty-six were wholly, and five partly justified, and twenty-eight were storm signals, of which fourteen were wholly, and eight partly justified. Forty signals were ordered for easterly winds, of which thirty-two were justified, and one hundred and fourteen were ordered for westerly winds, of which ninety-seven were justified. Percentage of justifications, 60.0.

No cold-wave signals were ordered during the month.

Percentages of verifications of weather and temperature signals reported by directors of the various State Weather Services for May, 1890.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois	82.0	81.5	Missouri	78.0	86.0
Indiana	80.0	88.0	New Jersey	77.5	89.9
Kansas	75.5	84.3	New York	84.0	88.2
Kentucky	90.0	93.0	North and South Dakota	80.0	80.0
Michigan	81.2	84.1	Pennsylvania	83.0	89.0
Minnesota	63.0	70.0	South Carolina	86.9	90.0

STATE WEATHER SERVICES.

[*Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.*]

The following extracts and summaries are republished from reports for May, 1890, of the directors of the various state weather services:

ALABAMA.

Temperature.—Highest monthly mean, 72.7, at Mobile; lowest monthly mean, 64.9, at Guntersville and Chepultepec; maximum, 92, at Gadsden, 31st; minimum, 34, at Double Springs, 8th; greatest local monthly range, 57, at Double Springs; least local monthly range, 34, at Mobile.